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Brinlee

[11] **4,046,117**

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[54] **VACUUM SUBJUGATED ACCELERATOR**

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[51] **Int. Cl.**[2] **F02D 11/08;** G05G 1/14

[52] **U.S. Cl.** ..... **123/103 C;** 123/103 R; 74/513

[58] **Field of Search** ..... 123/103 C, 103 E, 103 R; 180/108, 109; 74/513

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[57] **ABSTRACT**

This invention relates to a vacuum controlled apparatus to be placed between the foot accelerator of a vehicle and a carburetor of an internal combustion engine to regulate the opening of a throttle on the carburetor to maintain a relatively high vacuum in an internal combustion engine for better efficiency. The apparatus additionally effects gasoline savings and restricts the emission of pollutants into the atmosphere through the auto exhaust system. There is a housing containing a vacuum seal means generally controlled by the vacuum from the manifold of an internal combustion engine through an appropriate take-off. Additionally, spring means is associated with and co-act with the seal means to assist in the controlled opening of the throttle.

4 Claims, 7 Drawing Figures

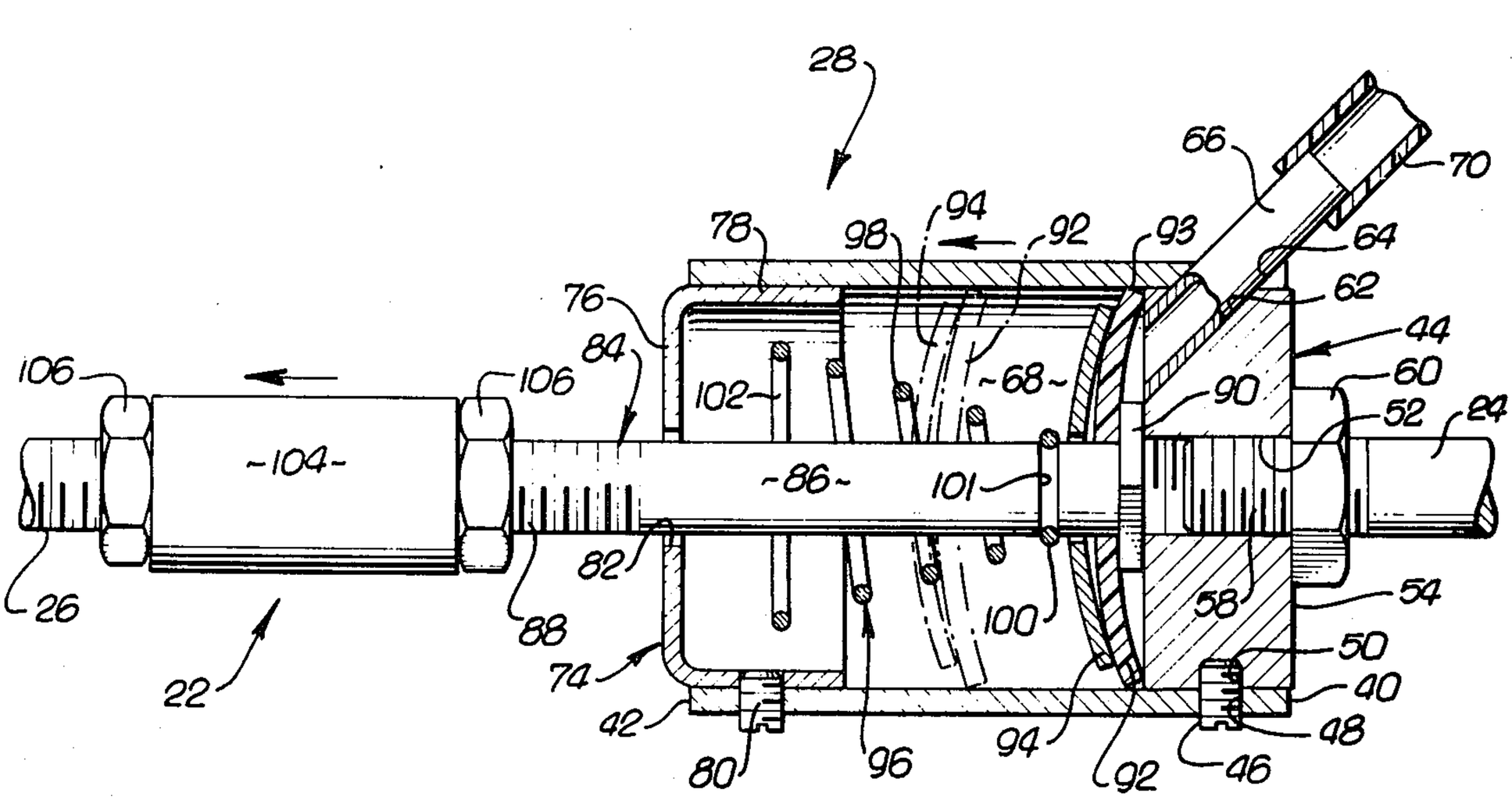


FIG. 1.

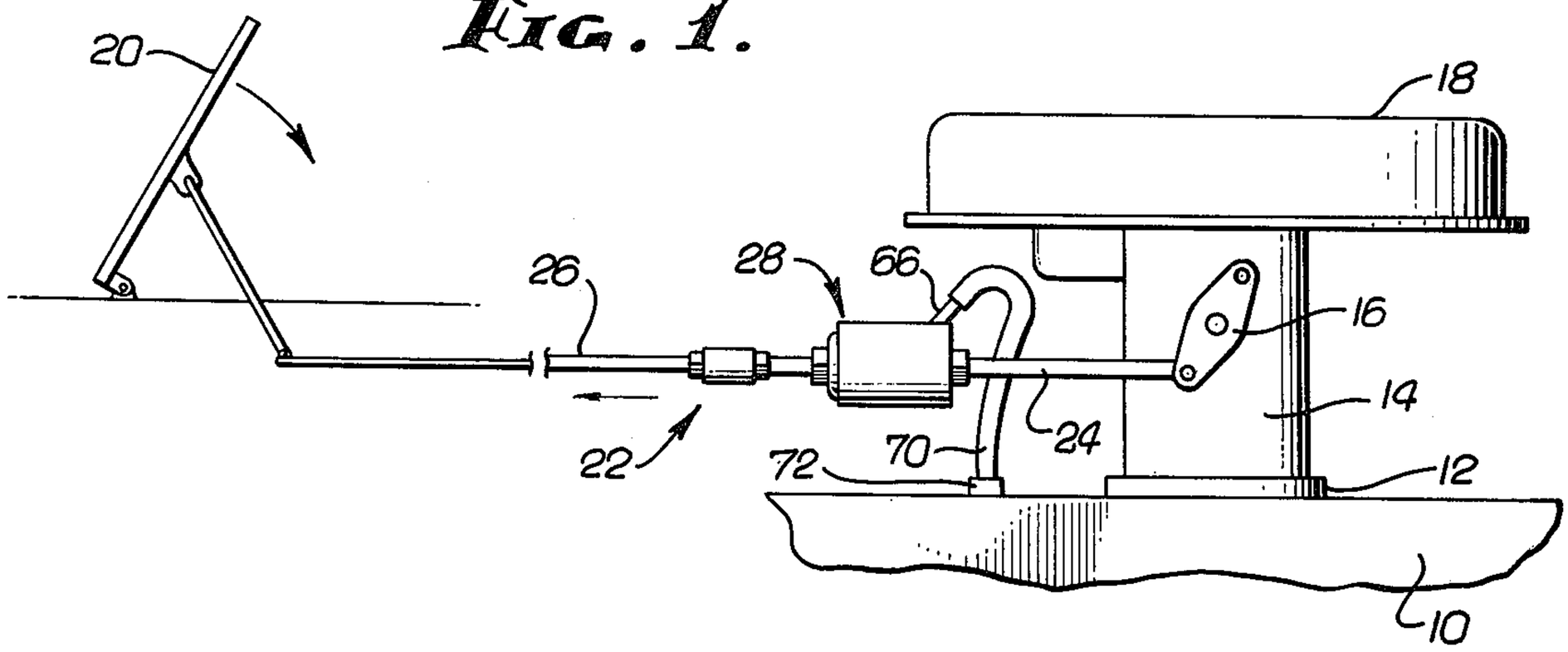


FIG. 2.

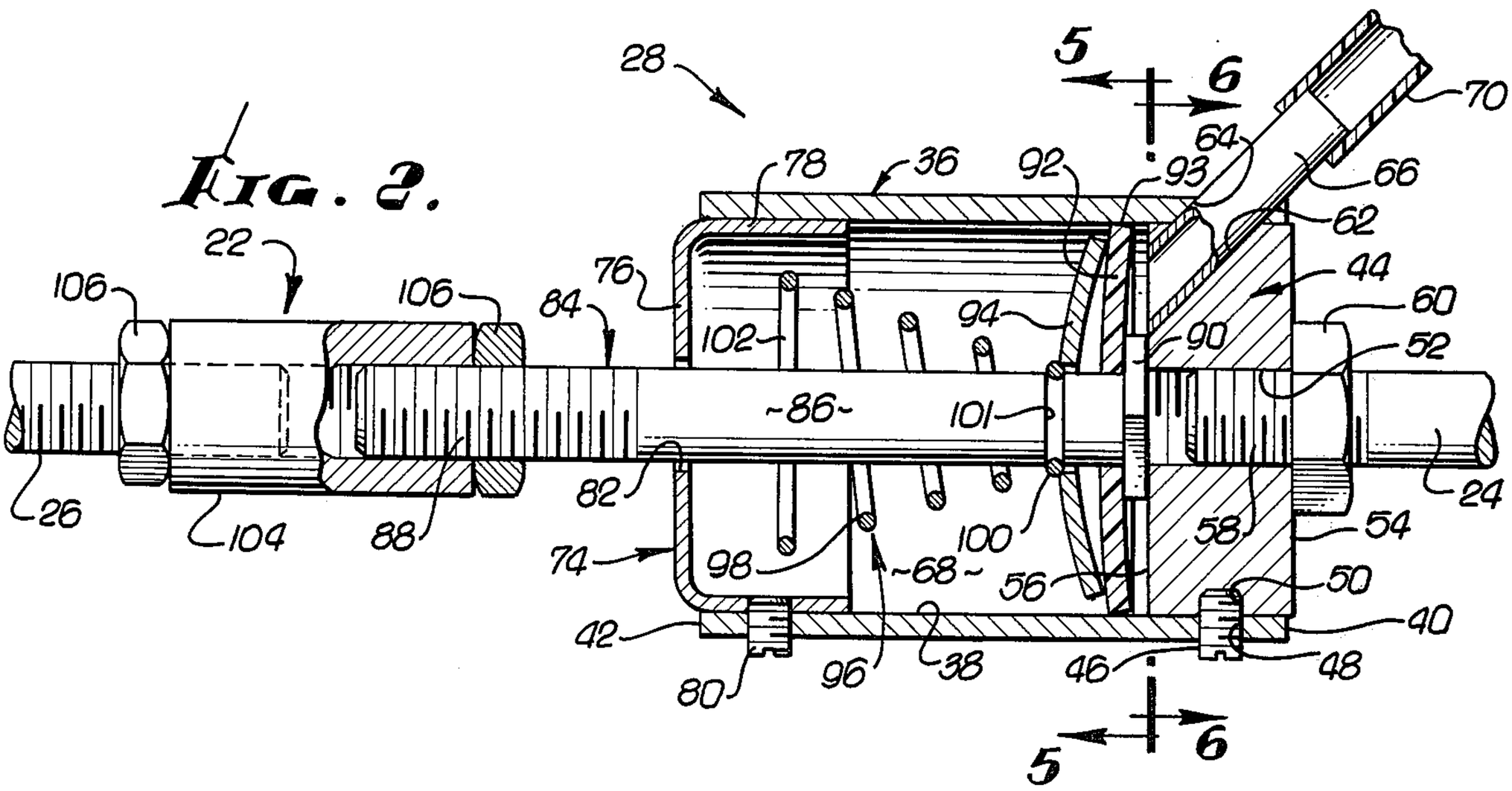


FIG. 3.

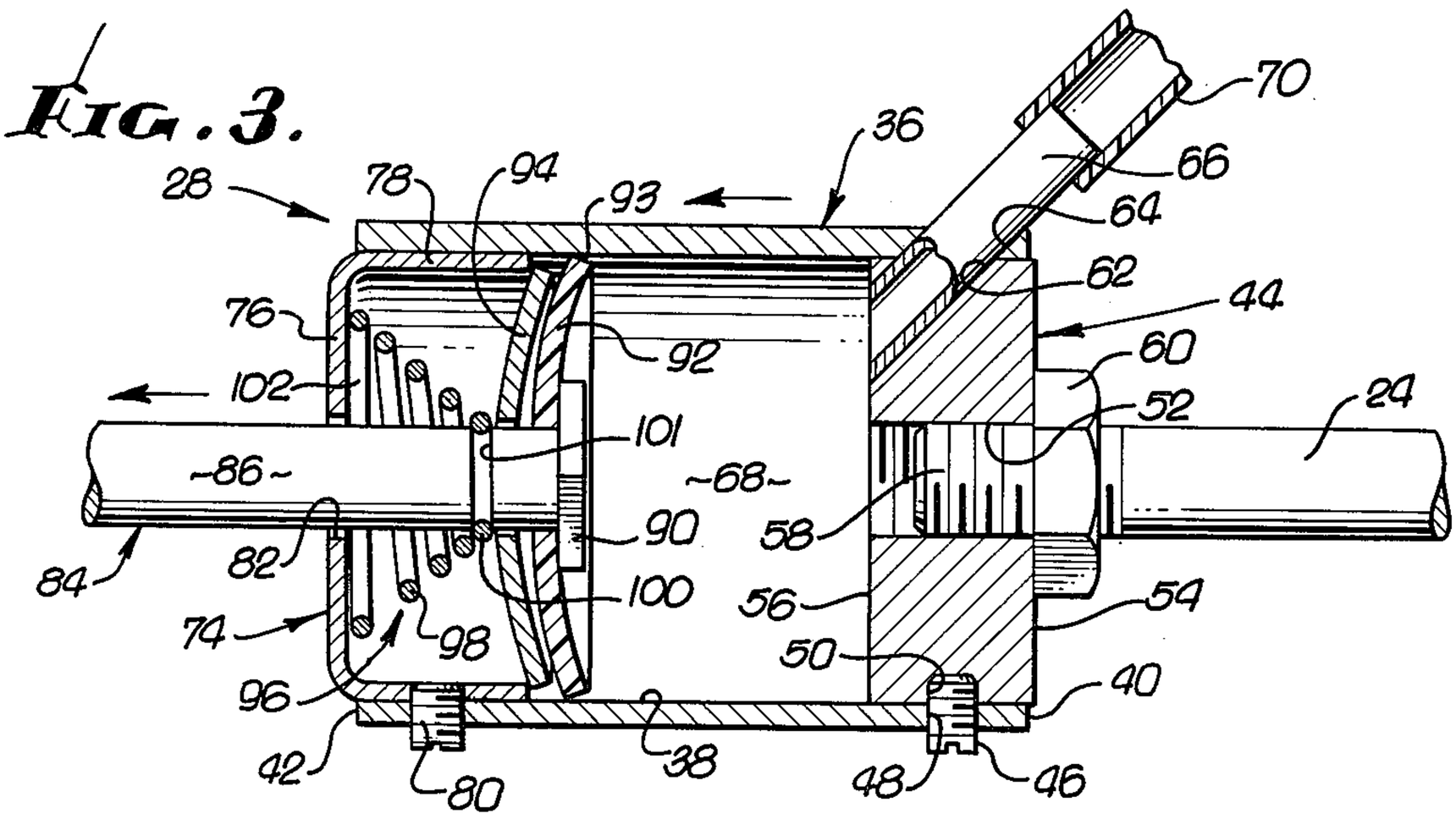


FIG. 4.

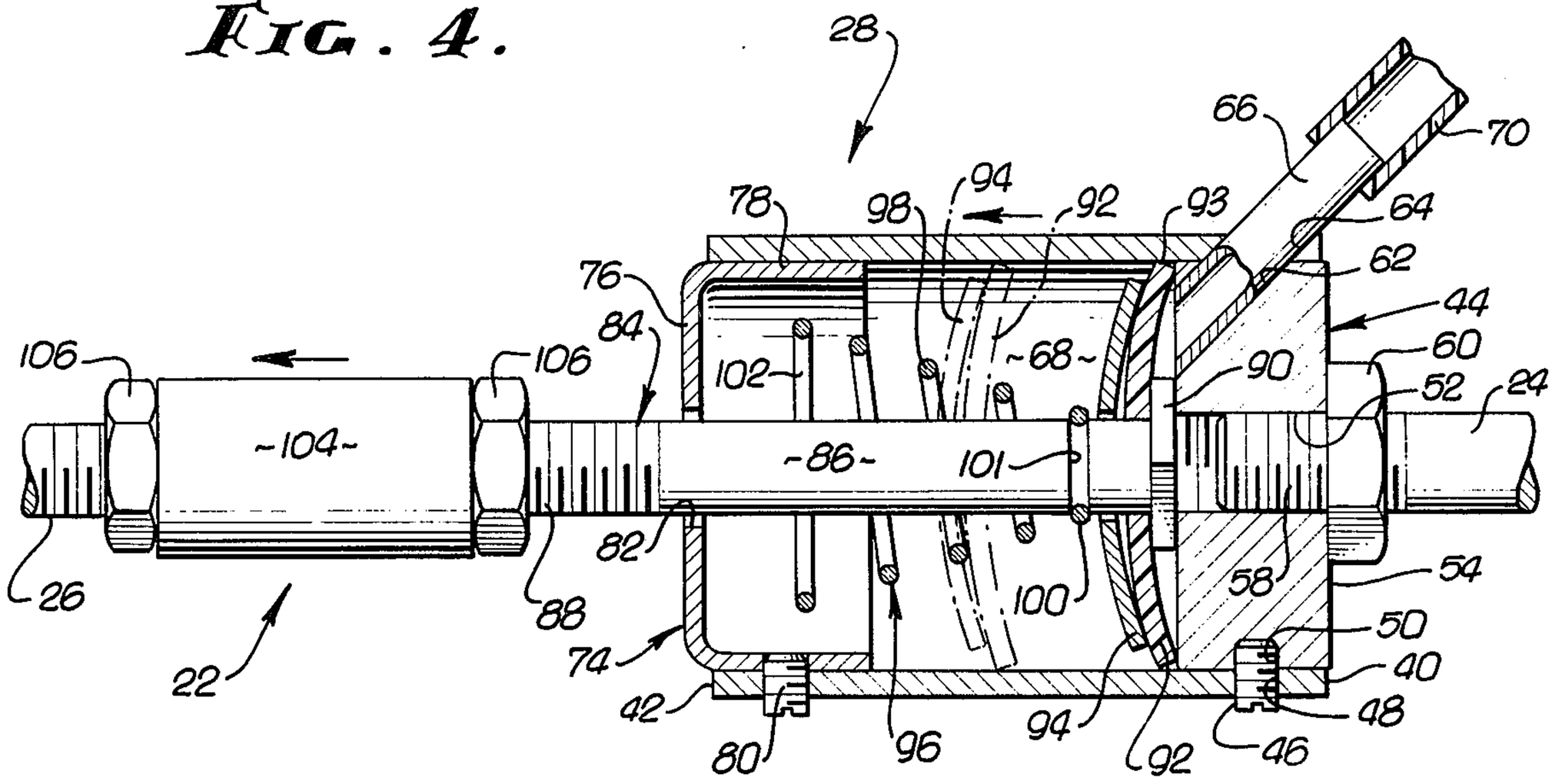


FIG. 5.

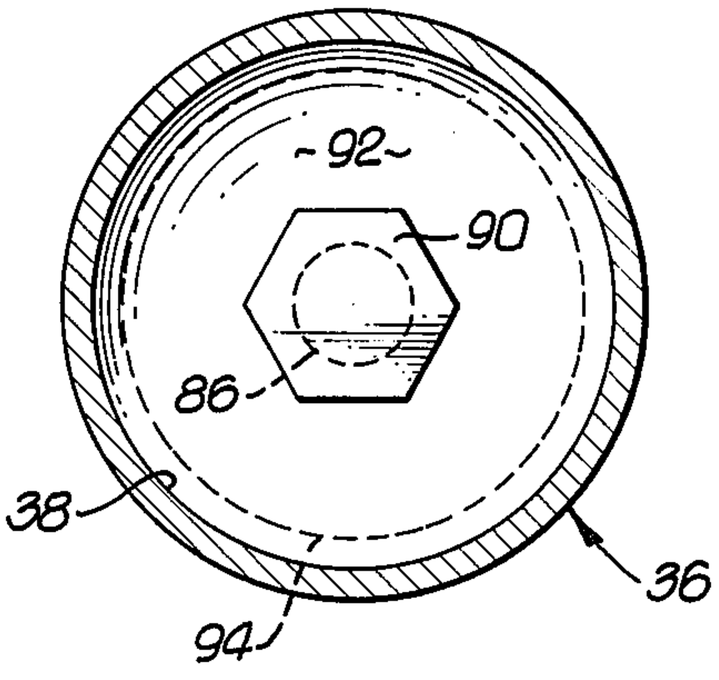


FIG. 6.

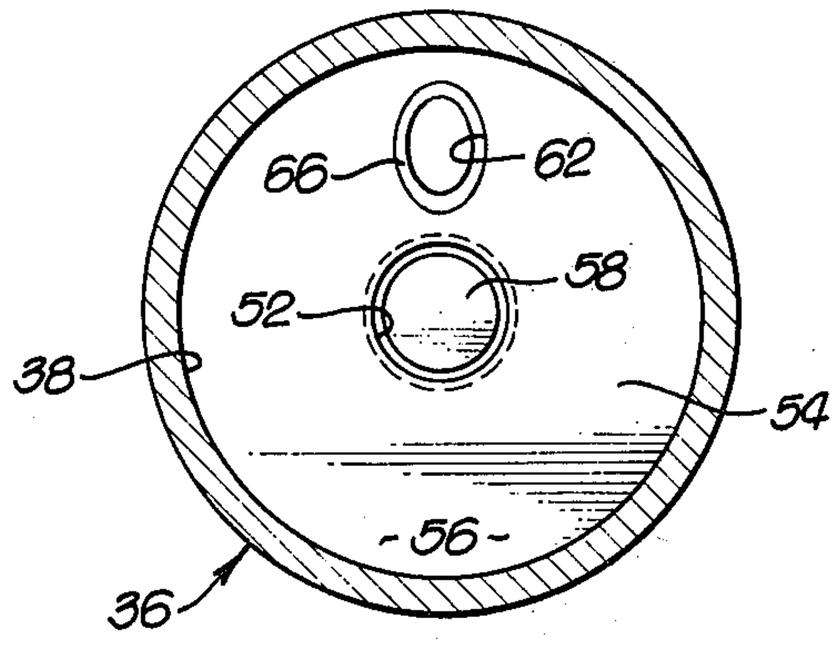
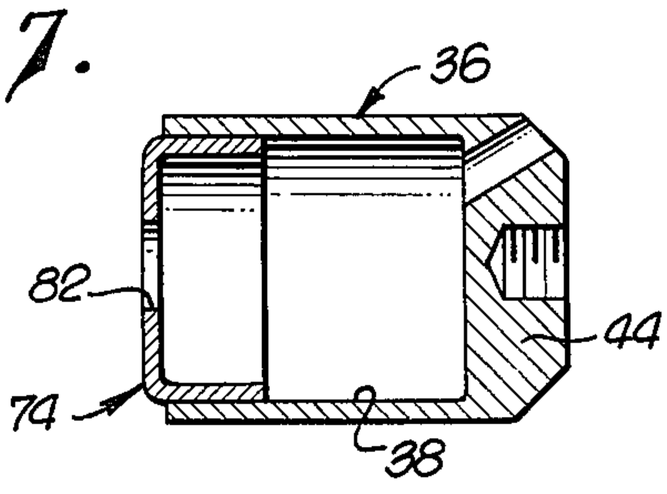


FIG. 7.



VACUUM SUBJUGATED ACCELERATOR

BACKGROUND OF THE INVENTION

In an internal combustion engine it has been found that where there is a direct linkage between the foot accelerator and the carburetor of such engine there is a tendency to over accelerate causing an excess flow of fuel to the carburetor and reduction of vacuum, thus rendering the internal combustion engine less efficient. Particularly is this true when the vehicle moves from a stopped idle position.

In the past there have been some forms of control mechanism inserted between the foot accelerator and the throttle to control the flow of fuel to the carburetor. These have ranged from various items such as a vacuum control brake means for governing acceleration as found in U.S. Pat. No. 2,157,652, throttle control devices such as found in U.S. Pat. No. 3,769,951 and even to the point of throttle resistors placed adjacent the foot accelerator such as found in U.S. Pat. No. 3,872,739.

However, none of these devices possess the internal structure of the present invention wherein the movement of the linkage between the foot accelerator and the carburetor throttle is controlled by means of a vacuum taken from the manifold of an internal combustion engine to assure a high vacuum and in turn save gasoline. Additionally, none of these devices are equipped with structure wherein the device itself may be overridden in an emergency where it is necessary to assume complete direct control of the acceleration between the accelerator and the throttle.

SUMMARY OF THE INVENTION

The present invention includes a spring loaded vacuum controlled device in the connecting linkage between a foot accelerator and the throttle of a carburetor of a vehicle with an internal combustion engine whereby the movement of the linkage on the foot accelerator side of the device can shift disproportionately to the shifting of the linkage between the device and the throttle. The disproportionate shifting can vary directly with the amount of vacuum which is applied to the device. In other words, a high vacuum produced through the manifold to the device will maintain the vacuum controlled device in a position whereby there is direct simultaneous movement of the connecting linkage. However, if the drive forces the accelerator down which normally reduces the vacuum, there would be independent rear movement of a portion of the device where the opening of the throttle would not be effected and no drastic vacuum drop is possible.

As an illustration, when a car is normally at a stopped, idle position, the vacuum is about 18 to 20 inches of mercury. However, as the car moves forward from the stop even if the foot accelerator is "floored," the vacuum will be maintained because there is no direct linkage to the throttle causing a 0 vacuum and waste of gas. The rear portion of the device can move rearwardly and as the vacuum increases the forward section of the device will move rearwardly which in turn will open the throttle for proper high vacuum acceleration.

The device includes a housing which is inserted in the connecting rod linkage between the foot accelerator to the throttle. One end of the housing is connected to the rod and directly to the throttle and is fixed so that movement of the housing directly opens or closes the throttle. On the other side of the housing the rod is

connected to apparatus within the housing whereby depression of the accelerator does not necessarily impart simultaneous movement to the entire housing and rod to the throttle. The movement is controlled by a disc seal attached to the linkage rod adjacent the foot throttle end and a spring member. There is also provided into the housing and chamber created therein a vacuum inlet from the manifold so that there will be a pulling of the disc toward the front end of the housing dependent upon the vacuum which is pulled within the housing. By this play directly proportionate to the vacuum, vacuum drop is prevented controlling a more uniform opening of the throttle and thus there is a savings on gasoline consumption.

Additionally, there is provided a spring override means within the housing which can assist the driver should it be necessary in an emergency to accelerate quickly providing in effect a direct linkage between the foot accelerator and the throttle.

Another advantage of this type of vacuum subjugated accelerator unit is that it may be adapted for interconnection between the foot accelerator and foot throttle whether or not the linkage is that of the type which upon depression of the foot accelerator will cause the linkage to move forwardly to open the throttle or that type of construction in vehicles wherein a depression of the foot accelerator will cause the linkage to move rearwardly which in turn will open the carburetor throttle.

These and other objects and advantages will become apparent from the following description and drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an environmental view showing the vacuum subjugated accelerator device in position between a foot accelerator of a vehicle and the carburetor of an internal combustion engine.

FIG. **2** is an enlarged side elevation cross sectional view of the vacuum subjugated accelerator device in a position it would assume when the engine is off.

FIG. **3** is a view similar to FIG. **2** which is an enlarged side elevation cross sectional view of the device showing the interior structure wherein there is an override of the device for emergency direct connection.

FIG. **4** is again a side elevation cross sectional view similar to FIGS. **2** and **3** showing the position of the interior structure when there is a vacuum created in the manifold, and also ghost positions of the interior structure.

FIG. **5** is a cross sectional view taken on line **5—5** of FIG. **2** showing the internal disc and retention portion of one part of the linkage rod between the foot accelerator and the carburetor throttle.

FIG. **6** is a cross sectional view taken on line **6—6** of FIG. **2** in the reverse direction from FIG. **5** showing the vacuum port as well as the opening for the permanent attachment of the linkage rod moving from the vacuum subjugated accelerator device to the carburetor throttle.

FIG. **7** is a side elevational view in cross section of a modified form of the housing of the vacuum subjugated accelerator.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

There is illustrated in FIG. **1** a fragmented portion of a manifold **10** of an internal combustion engine, not

illustrated. Attached to the manifold **10** is a carburetor mount **12,** and secured to the mount **12** is a conventional carburetor **14** including a conventional spring throttle **16** which is pivotally mounted and is adapted to control the flow of fuel through the carburetor **14** into the engine.

Mounted atop the carburetor is an air filter **18** which may be of any conventional type.

Connected to the carburetor throttle **16** and extending rearwardly to a foot accelerator **20** is a linking rod means, generally designated **22,** which includes a forward rod **24** and a rearward rod **26.** Mounted between the rods **24** and **26** is the vacuum subjugated accelerator device, generally designated **28.**

In the illustrated embodiment of FIG. **1,** the depression of the foot accelerator **20** in the direction of the arrow, through linkage not illustrated, will cause the linking rod **22** to move rearwardly in the direction of the arrows to open the throttle **16.**

The details of the vacuum subjugated accelerator unit **28** are shown in FIGS. **2** through **6.** There is preferably provided a hollow annular metal housing **36** having an annular inner wall **38,** and a forward end **40** and rear end **42.** Mounted in the forward end **40** of housing **36** is an annular metal plug **44** adapted to extend into the hollow housing a predetermined distance. The plug **44** is preferably of a diameter approximate the inner diameter of the housing to assure a snug fit. In order to maintain the plug **44** in position a set screw **46** is provided which passes through an opening **48** in the housing into a bore **50** in the plug **44.**

The plug **44** includes a threaded bore **52** extending between the plug outer face **54** and inner face **56.** The bore **52** is adapted to receive a threaded end **58** of the forward rod **24** of the linking rod means **22.** A lock nut **60** is also provided to maintain the rod **24** in a fixed position within the plug **44** when tightened against outer face **54.**

As the rod **24** is locked to the plug **44** it can be seen that movement of the rod **24** or housing **36** will directly move the throttle **16,** so there is a direct integral movement of the housing and throttle.

The plug **44** also includes a vacuum tube bore **62** which is opposite the set screw **46** and angles upwardly from inner face **56** and is aligned with a bore **64** extending through the wall of the housing **36.** Press fitted through bores **64** and **62** is a vacuum tube hollow coupling **66** communicating with a chamber **68** created within the housing **36.**

Attached to the hollow coupling **66** is a flexible vacuum tube **70** which extends downward to a vacuum fitting **72** secured in the vacuum manifold **10** as best seen in FIG. **1.**

While the plug **44** has been described as a separate piece of metal it has been found that the housing **36** and end plug **44** may be made as one piece without departing from the spirit of the invention, as illustrated in FIG. **7,** so that there is a tubular housing with a forward wall.

At the opposite end **42** of housing **36** there is provided a cap member **74** which as can best be seen in FIG. **2** is preferably dish shaped having an end wall **76** and an annular wall **78** extending normal to the plane of end wall **76.**

The diameter of the outer portion of annular wall **78** is complimentary with the inner wall **38** of housing **36** and is press fitted within the housing. A set screw **80** passing through the wall of the housing **36** will assist in maintaining the cap member **74** in place. The positioning of the cap member **74** will complete the closed chamber **68** within the housing **36.**

The end wall **76** is also provided with a central opening **82** extending therethrough.

Mounted within the chamber **68** and extending rearwardly through opening **82** is a laterally slidable disc rod **84.** The rod **84** is axially aligned with forward rod **24.** The rod **84** includes an elongated shank portion **86** having threads **88** at one end and a head **90** at the other end.

It should be noted that the opening **82** is generally larger than the shank portion **86** of rod **84.** The reason for this is to allow the escape of air as the shank and rod **84** move rearwardly within the housing **36.**

Mounted on the elongated shank **86** and abutting the head **90,** when in an at rest position is a disc seal **92.** The disc seal **92** is flexible and preferably made of nylon, teflon or other pliable sheet material having a memory and returnable to the position shown in FIG. **2.** The diameter of the disc seal **92** is slightly greater than the internal diameter of the chamber **68** so that a drag is created with rearward movement of the disc **92** and rod **84** when the disc is in a vertical profile. Additionally, as seen in FIG. **2** the outer portion of the disc seal is slightly bowed forwardly toward the wall **56** of plug **44.**

Rearwardly of the disc seal **92** there is provided a cup shaped fixed disc **94** mounted on the elongated shank **86** and of a diameter less than the internal diameter of the chamber **68.**

Rearwardly of the disc seal **92** there is provided a spring means **96** which is preferably a conical concentric coil spring **98** surrounding the rod **84.** The forward convolution **100** is preferably secured in an annular groove **101** in the rod **84** and abuts the rear surface of the disc **94,** maintaining the same from moving rearwardly on the rod **86.** By the perimeter of the fixed disc **94** engaging the rear surface of the disc seal and the head **90** engaging the front surface of the disc seal the assembly is fixed as to movement on the rod **86.**

The spring convolution **102,** which is remote from convolution **100,** does not engage any portion of the housing **36** or end wall **76.** When the unit is in an at rest position, see **FIG. 2.**

In order to attach the disc rod **84** to the rearward linkage rod **26** of the linking rod means **22** a threadable coupling **104** is utilized and lock nuts **106** may be used to assure a locking of rods **26** and **84** for simultaneous movement.

When the engine is running a vacuum is created and a position of the disc seal **92** as illustrated in FIG. **4** will be assumed. With a vacuum being drawn through coupling **66,** the disc seal **92** as can be seen will be further cupped at its annular periphery so that the annular end is engaging the corner created by wall **56** of plug **44** and the inside wall **38** of housing **36.**

This position will move the annular edge **93** of the disc seal **92** from full drag contact with the annular wall **38,** best seen in FIG. **2** to a partial corner engagement with wall **38** best seen in FIG. **4.** In other words, the diameter of the disc seal **92** is slightly reduced when a vacuum is present.

The position of the disc seal **92** of FIG. **4** is the optimum position where there is normally a high vacuum so that the entire unit **28** will move simultaneously.

However, should the foot accelerator be pushed down and the rod **26** be moved rearwardly in the direction of the arrow, FIG. **4,** the disc seal **92** may be moved rearwardly in the housing **36** such as shown in ghost

lines of that view. In other words, the vacuum can be overcome, but assuming the emergency phase is not involved, there is no momentary direct movement of the housing or forward rod **24** to flood the carburetor and decrease the engine vacuum. The disc seal **92** will momentarily float in the chamber **68,** but because the vacuum has not really been reduced within the chamber **68,** the vacuum will draw on the disc **92** but being held by the foot accelerator the housing **36** and in turn rod **24** will move rearwardly to close the gap. This will open the throttle to maintain a contrast high vacuum and the disc seal **92** will again engage wall **56** for direct movement of linkage means and maintenance of the desired higher vacuum.

Therefore, to assure steady driving to increase efficiency and gas mileage, slight foot accelerator push is the optimum so the unit **28** stays in the vacuum locked position of FIG. **4.** Any heavy foot action causes a differential of movement so no 0 vacuum is created.

The purpose of the disc plate **94** is to prevent a reversal of the disc seal **92** when the housing moves rearwardly. The arc of the disc is generally complementary with the arc of the disc seal and acts to stabilize the disc seal if any drag is exerted on the peripheral edge **93.**

In FIG. **3** there is illustrated the position of the disc seal **92** and disc plate **94** when the unit **28** is in an emergency situation. If the driver needs to overcome the differential movement, the foot accelerator can be depressed to a point where the rod **26** will be moved rapidly rearwardly causing the disc plate **94** to peripherally engage the edge of wall **78** of cap **74.** This will effect a direct movement of the housing **36** and rod **24** rearwardly instantaneously opening the carburetor throttle. The spring **96** as seen in FIG. **3** will be compressed and biased against the cap **74.** As the speed of the vehicle increases and then is stabilized the engine will return to a normal high vacuum whereby the spring **96** will assist the draw of the high vacuum to move the housing **36** rearwardly and retain the disc seal **92** to its normal optimum position as shown in FIG. **4.**

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention.

I claim:

1. A vacuum subjugated accelerator apparatus for use with an internal combustion engine interposed in control linkage between a foot accelerator and carburetor throttle for modulating the flow of gasoline to said carburetor and in turn achieving an optimum vacuum within an intake manifold of said engine for motor efficiency and gas savings comprising:

an annular housing having forward and rearward ends and a horizontal axis, said housing including an end wall closing said forward end of said housing;

a removable cap sealing said rearward end of said housing, said cap having a bore extending therethrough on the horizontal axis of said housing;

said housing, end wall and cap means, defining a vacuum chamber;

coupling means associated with said end wall receiving a portion of said control linkage extending directly to said throttle of said carburetor whereby horizontal movement of said housing will impart direct opening and closing of said throttle;

a vacuum port extending through said end wall communicating with said vacuum chamber adapted to receive tubular means extending from said intake manifold of said engine to said vacuum port to create a vacuum within said vacuum chamber;

a slidable disc rod extending from within said chamber through said bore of said cap means axially aligned on said housing axis, said disc rod coupled to a portion of said control linkage extending directly to said foot accelerator whereby foot depression of said accelerator will impart direct rearward axial movement of said slidable disc rod, said disc rod including an enlarged head portion within said vacuum chamber;

annular flexible disc seal means mounted on said slidable disc rod with the central portion of said flexible disc bearing against said enlarged head of said sic rod;

a disc plate mounted on said disc rod rearwardly of said flexible disc, said plate being dished with a periphery thereof in contact with said flexible disc biasing said flexible disc in a concave position toward said front wall;

spring means including a portion locking said disc plate against said flexible disc and additionally extending rearwardly therefrom toward said cap means;

said flexible disc seal being adapted to be further peripherally curved away from the annular interior of said housing toward said end wall when a higher vacuum is produced through said vacuum port whereby drag on said flexible disc and in turn said disc rod and linkage extending to said accelerator is created yet said disc rod and flexible disc seal being movable from said end wall toward said cap means without directly affecting the opening of said throttle and said flexible disc seal yieldably returnable to a position wherein there is partial contact between said flexible disc and said end wall in an optimum position whereby direct movement of said control linkage and vacuum subjugated accelerator means can be achieved.

2. An apparatus as defined in claim **1** wherein said bore in said removable end cap is larger than the diameter of said slidable disc rod wherein air within said chamber behind said disc plate may be expelled when said disc rod moves rearwardly.

3. A vacuum subjugated accelerator apparatus for use with an internal combustion engine interposed in control linkage between a foot accelerator and carburetor throttle for modulating the flow of gasoline to said carburetor and in turn achieving an optimum vacuum within an intake manifold of said engine for motor efficiency and gas savings comprising:

an annular housing having forward and rearward ends and a horizontal axis, said housing including an end wall closing said forward end of said housing;

a removable cap sealing said rearward end of said housing, said cap having a bore extending therethrough on the horizontal axis of said housing;

said housing, end wall and cap means, defining a vacuum chamber;

coupling means associated with said end wall receiving a portion of said control linkage extending directly to said throttle of said carburetor whereby horizontal movement of said housing will impart direct opening and closing of said throttle;

a vacuum port extending through said end wall communicating with said vacuum chamber and tubular

means extending from said intake manifold of said engine to said vacuum port;

vacuum subjugated disc means mounted in said chamber and including a projection extending along the axis of said housing rearwardly through said bore of said cap, said vacuum subjugated disc means axially moveable independently of said housing yet adapted to be yieladable lockable to said end wall by a vacuum created through said vacuum port whereby said housing and said vacuum subjugated disc means can be moved as an integral unit assuring throttle control to effect a high vacuum in said manifold;

coupling means associated with said projection receiving a portion of said control linkage extending to said foot accelerator, whereby excessive depression of said foot accelerator may impart axial movement to aid vacuum subjugated disc means and overcome said vacuum thereby creating said independent movement of said subjugated disc means without affecting the vacuum created in said manifold,

said vacuum subjugated disc means further includes an annular flexible disc with a peripheral edge and wherein said disc is dish-shaped and the concave surface faces said end wall and said peripheral edge engages the wall of said chamber, and

wherein a dish-shaped disc plate is mounted on said projection rearwardly of said flexible disc biasing said flexible disc in said dish shape.

4. Apparatus as defined in claim **3** wherein there is a spring mounted on said projection rearwardly of said disc plate which is normally in a suspended position yet when said disc means is moved to an extreme rearward position to overcome the vacuum in an emergency situation for direct accelerator to throttle movement said spring will engage said cap means and assist in the return of said disc means including said flexible disc to its normal forward wal contact when the desired speed of said engine has been achieved.

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